

### **REMARKS**

Favorable reconsideration and allowance of this application are requested.

As a procedural note, the present amendment is being filed concurrently with a formal Request for Continued Examination (RCE) under 37 CFR §1.114. Accordingly withdrawal of the "finality" of the June 1, 2005 Official Action and the previously noticed appeal are in order so as to allow entry and consideration of the amendments and remarks presented herewith.

#### **1. Discussion of Claim Amendments**

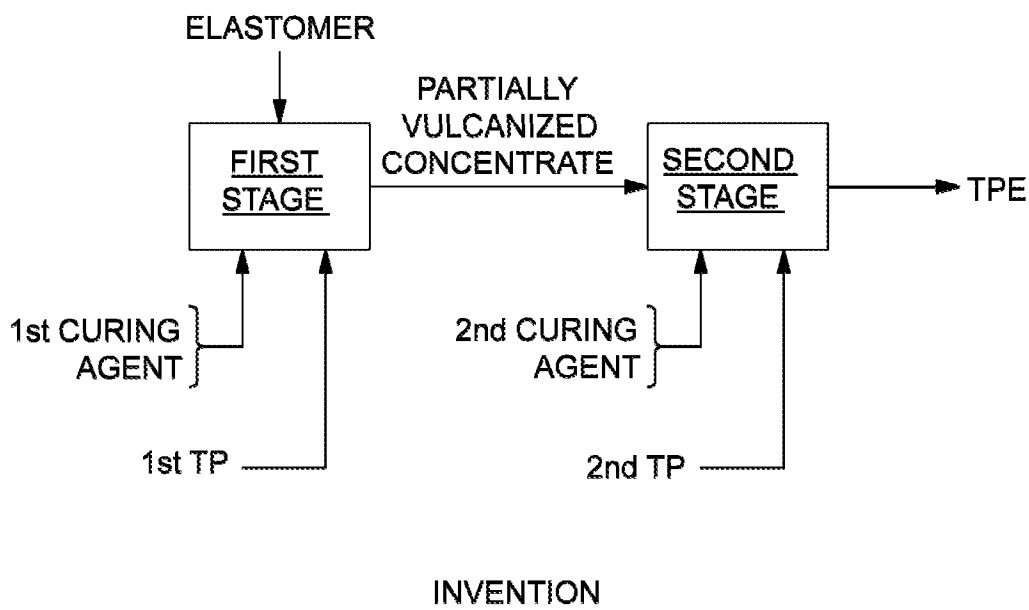
By way of the amendment instructions above, previously pending claims 14-25 have been cancelled thereby leaving claim 26 as the sole independent claim pending herein for consideration. Claim 37 has been revised so as to emphasize that the first and second curing agents employed in the first and second dynamic vulcanization stages, respective, are the same. Various other clarifying revisions have been proposed to several other pending claims (e.g., so as to conform the language with reference to the vulcanization "stages" in claims 29 and 36).

Claims 41 and 42 are new and emphasize that each of the first and second thermoplastic polymers in the first and second vulcanization stages is the same. Support for such new claims can be found on page 6, lines 7-10 as well as the Examples.

Therefore, following entry of this amendment claims 26-42 will remain pending herein for consideration.

## 2. Summary of Claimed Invention

One principal distinction between the presently claimed invention and the applied prior art of record (e.g., Wang et al, USP 5,936,039)<sup>1</sup> is that **two dynamic vulcanization** stages are employed to form the thermoplastic elastomer (TPE). Thus, in a first vulcanization stage according to the present invention, an elastomer, a first thermoplastic polymer and a first curing agent are compounded (melt-mixed) with one another under dynamic vulcanization conditions to obtain a partially vulcanized rubber concentrate. Thereafter, in a second dynamic vulcanization stage, the partially vulcanized rubber concentrate is compounded (melt-mixed) with **additional amounts** of both a second thermoplastic polymer and a second curing agent. A schematic representation of the presently claimed invention is depicted below.



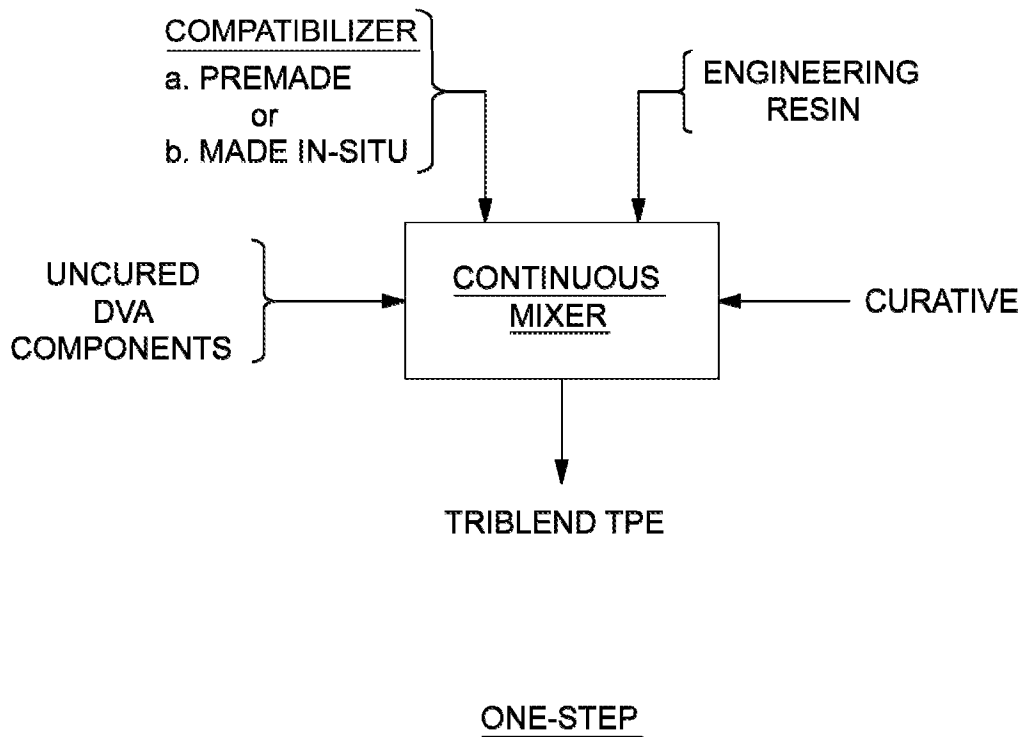
<sup>1</sup> To ensure integrity of the official record, it is noted that a typographical error appears in the citation to Wang et al in the penultimate paragraph on page 2 of the Official Action. Thus, US 5,963,039 should have been cited as US 5,936,039.

Each of the first and second thermoplastic polymers on the one hand and the first and second curing agents on the other hand may be the same or different. In some preferred embodiments, the first and second thermoplastic polymers on the one hand and the first and second curing agents on the other hand are the same. As demonstrated by the Examples and Comparative Examples on pages 9-13 of the originally filed specification, improved TPE properties ensue, particularly improved oil swell, when two vulcanization stages are performed (i.e., whereby a partially vulcanized rubber concentrate is compounded (melt-mixed) with additional amounts of both a second thermoplastic polymer and a second curing agent).

### **3. Response to Art-Based Rejections**

The Examiner persists in his rejection of all prior claims as either anticipated by Wang et al alone under 35 USC §102(b) or as being obvious under 35 USC §103(a) over Wang et al in view of Komatsu et al. In this regard, the Examiner seems to be of the mistaken belief that Wang et al discloses "...a two-step process that provides a partially cured DVA for addition to a second thermoplastic with subsequent further dynamic vulcanization." (Office Action at page 2, ultimate paragraph.) Applicants respectfully suggest that the Examiner's reading of Wang et al is factually flawed which has therefore led to a legally erroneous rejection of the claims.

Wang et al is directed toward the preparation of a triblend TPE of (1) an engineering resin, (2) a dynamically vulcanized alloy (DVA) of a thermoplastic olefin polymer and an elastomeric copolymer and (3) a compatibilizer for components (1) and (2). (Abstract and column 4, lines 14-16.) Wang et al contemplates either a one-step process wherein the triblend TPE is produced in a single step in a single process vessel, such as a twin-screw extruder (column 7, lines 16-21 and column 8, lines 50-54). Schematically, the one-step process of Wang et al can be depicted as follows:



Alternatively, a two-step process is disclosed in Wang et al wherein the triblend TPE is produced in multiple steps using either multiple process vessels or multiple passes through the same process vessel. (column 7, lines 65-66.) The uncured DVA components may either be mixed together without vulcanization or may be mixed together and vulcanized prior to the addition of the other two components, namely the engineering resin and compatibilizer (which itself may be pre-made or made in-situ). Thus, in either the proposed batch, batch-continuous or continuous two-step processes proposed by Wang et al, the uncured DVA components can simply be mixed together in a first process vessel without curing and then transferred to a continuous process vessel (e.g., an extruder) where curative, engineering resin and compatibilizer are added. (Column 7, line 66 through column 8, lines 47.) In this scenario, the uncured

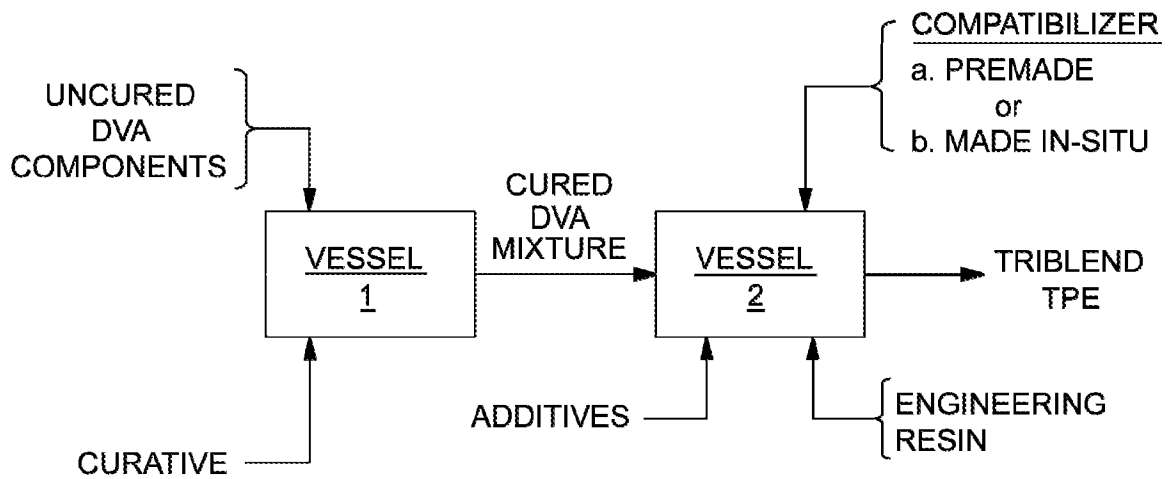
DVA components are vulcanized (cured) in the second process vessel (or the second pass through the same vessel), that is a downstream cure procedure.

Alternatively, according to Wang et al, the first step of the two-step process (either batch, batch-continuous or continuous) may be practiced in such a way that the uncured DVA components are cured (vulcanized), that is an upstream cure procedure. Specifically, at column 7, lines 23-24, Wang et al instruct that:

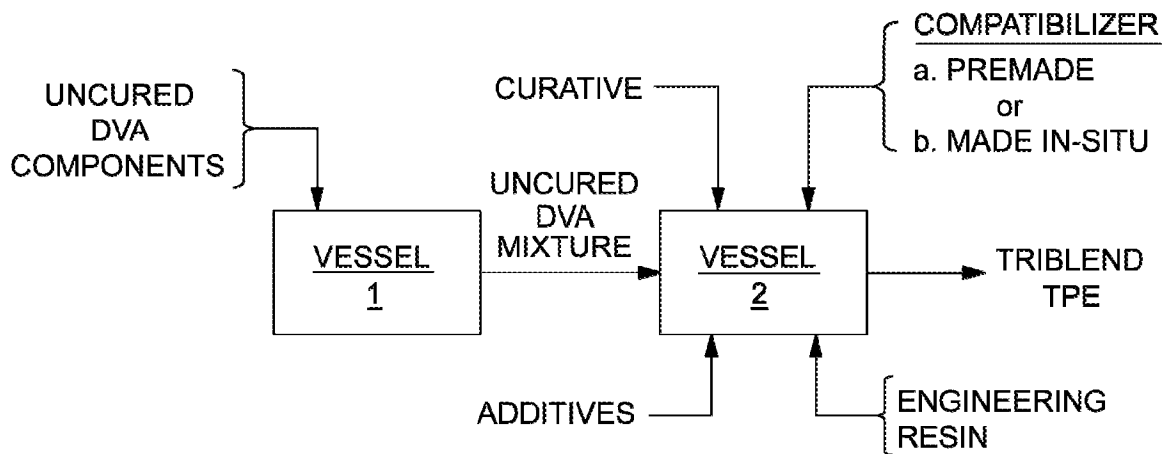
“In [the two-step procedure] the first vessel [or the first pass through the same vessel] the *uncured* components of the DVA can be mixed and alternatively vulcanized. The *premixed or vulcanized materials* are then fed into a second vessel or a second pass through the same vessel where they are then *either subsequently vulcanized or then blended with the compatibilizer and the engineering resin*.  
(Column 7, lines 23-28, emphasis added.)

Thus, Wang et al explicitly teaches that only a **single** vulcanization stage is employed. In other words, if the DVA and other components are premixed in a first step, then the DVA components are vulcanized in a second step. Alternatively, if the components are first vulcanized in a first step, then they are mixed with the other components in a second step. While the timing of the addition of the other components may vary, Wang et al nonetheless makes it clear that one – and only one – vulcanization stage is contemplated.

Thus, the two different scenarios of the two-step processes – i.e., an upstream cure procedure and a downstream cure procedure -- disclosed by Wang et al (either batch, batch-continuous or continuous) may be schematically depicted by the following:



TWO-STEP - UPSTREAM CURE



TWO-STEP - DOWNSTREAM CURE

The Examiner seems to read various parts of Wang et al in complete isolation and *not* within the context of the entire disclosure therein. Thus, for example, the Examiner apparently seizes on the passage in Wang et al at column 3, lines 40-44 with regard to the possibility that the elastomer may be “partially cured” during the dynamic vulcanization. However, this passage simply informs the reader that, in the triblend TPE of Wang et al, a fully cured DVA component is not necessarily needed. Instead, according to Wang et al at column 3, lines 40-44, the resulting triblend TPE can tolerate a partially cured DVA even though a fully cured DVA is preferred. This passage by itself is not suggestive at all of **multiple** curing stages.

The Examiner also apparently seizes on the disclosure appearing in Example 1 at column 9 and Table I bridging columns 9 and 10 of Wang et al as disclosing a “first curing agent” in the form of ZnO. While Wang et al does disclose at column 5, lines 17-21 that metal oxides may be a “curative” to achieve dynamic vulcanization of the DVA components, its mere presence in the “Masterbatch” of Example 1 does not in and of itself translate into a dynamic vulcanization of the Masterbatch components as the Examiner erroneously concludes. Indeed, Wang et al **explicitly** state that the Masterbatch is “**uncured**”.<sup>2</sup>

The fact that ZnO is disclosed by Wang et al to be a “curative” and is in fact present in the Masterbatch of Example 1 clearly does not imply anything contrary to what Wang et al explicitly states – that is, that the Masterbatch is “uncured”. Thus, the presence of ZnO in the Masterbatch of Example 1 does not imply that some spontaneous curing occurs notwithstanding the explicit statement by Wang et al that the Masterbatch is in fact “uncured”. In this regard, Wang et al note that:

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<sup>2</sup> “The blend was removed from the mixer and the uncured masterbatch was added to the inlet...”; Column 1, lines 30-32, emphasis added. See also, the explicit characterization of the Masterbatch as being “Un-cured” in Table I at column 9, line 64.

“Those ordinarily skilled in the art will appreciate the appropriate quantities, types of cure systems and *vulcanization conditions* required to carry out the vulcanization of the rubber. The elastomer can be vulcanized using varying amounts of curative, varying temperatures and varying time of cure in order to obtain the optimum crosslinking desired. Any known cure system can be used, so long as it is suitable under the *vulcanization conditions* of the elastomer or combination of elastomers being used and is compatible with the thermoplastic polyolefin component of the DVA.” (Column 5, lines 7-17, emphasis added)

It is clear therefore that, while ZnO may in fact be physically present in the Masterbatch of Example 1, the Masterbatch most certainly is **not** subjected to “vulcanization conditions” in the presence of the ZnO curative since the Masterbatch is “uncured” after being melt-mixed to form a homogenous blend. (Column 9, lines 27-30.) It is this uncured homogenous Masterbatch blend that is then transferred to the extruder to undergo vulcanization. (Column 9, lines 30-35.)

Uncured of course means “not cured”. It most certainly does mean “partially cured”. Thus, the Examiner cannot distort the explicit language in Wang et al in an effort to justify his rejection. Nor can this explicit language in Wang et al be ignored as to what it in fact means, i.e., uncured means “not cured”. This is especially true in light of the other disclosure in Wang et al at column 7, line 65 through column 8, line 47 as discussed above. To assert as the Examiner has apparently done in this particular



instance is suggested to be evidence of an impermissible hindsight analysis that amounts to clear reversible error.<sup>3</sup>

That Wang et al does **not** disclose or suggest **two dynamic vulcanization stages** should now be clear. Self-evidently, therefore, Wang et al does **not** disclose or suggest that the **same** thermoplastic and/or the **same** curing agents may be used in such two dynamic vulcanization stages as defined, e.g., by pending claims 37 and 41.

Thus, for the reasons noted above and during prosecution to date, Wang et al cannot anticipate the presently claimed invention under 35 USC §102(b).

Nor does the combination of Wang et al with Komatsu et al render obvious the present invention under 35 USC §103(a).

Specifically, Komatsu et al (see for instance the abstract) discloses that a **different** elastomer is added in the second step, whereas in the process of the presently claimed invention, there is no second (or even third or fourth) elastomer added when conducting the second dynamic vulcanization stage. Instead, according to the presently claimed invention, it is the partially vulcanized rubber concentrate obtained from the first dynamic vulcanization stage that is melt-mixed with additional amounts of a second thermoplastic polymer and a second curing agent under dynamic vulcanization conditions.

In addition, step 1 of the Komatsu et al process includes dynamically vulcanizing the olefinic rubber by the peroxide while step 2 includes curing the second rubber (halogenated butyl rubber) by means of the zinc oxide. This most definitely is NOT a two-step curing of the EPDM rubber per se as zinc oxide by itself is not a good cross-

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<sup>3</sup> The Federal Circuit regards hindsight as an insidious and powerful phenomenon and is a tempting, but forbidden zone in the inquiry of addressing the statutory obviousness standard. See, e.g., *Panduit Corp. v. Dennison Mfg. Co.*, 227 USPQ 337 (Fed. Cir. 1985) and *Loctite Corp. v. Ultraseal Ltd.*, 228 USPQ 90, 98 (Fed. Cir. 1985).

linker for olefinic rubber (as described for EPDM rubber above). Thus, in proper context Komatsu et al describe a one step curing of the olefinic rubber and then the addition of a second rubber in step 2 which is also only cured *once* by zinc oxide.

The advantages of the applicants' claimed two-step curing process vs. the one-step curing process of Komatsu et al are as indicated in the description on page 1, line 33 through page 2, line 4 and are proven by the examples provided in the originally filed specification.

To summarize, therefore, Komatsu et al disclose only a one-step curing process wherein a once-cured olefinic rubber is blended with a similarly once-cured (i.e., by ZnO) rubber. This disclosure in Komatsu et al therefore most certainly is not instructive of the two-step curing process as claimed in the present application wherein **two dynamic vulcanization** stages are employed to form the thermoplastic elastomer (TPE) such that, in a first vulcanization stage an elastomer, a first thermoplastic polymer and a first curing agent are compounded (melt-mixed) with one another under dynamic vulcanization conditions to obtain a **partially vulcanized rubber concentrate**, and thereafter, in a second dynamic vulcanization stage, the partially vulcanized rubber concentrate is compounded (melt-mixed) with **additional amounts** of both a second thermoplastic polymer and a second curing agent.

Komatsu et al therefore fails to cure the deficiencies of Wang et al as discussed previously. For these reasons, the combination of Wang et al and Komatsu et al would not yield the presently claimed invention. Withdrawal of the rejection advanced under 35 USC §103(a) is therefore in order.

#### 4. Fee Authorization

The Commissioner is hereby authorized to charge any deficiency, or credit any overpayment, in the fee(s) filed, or asserted to be filed, or which should have been filed

**WANG et al**  
**Serial No. 10/501,902**  
October 28, 2008

herewith (or with any paper hereafter filed in this application by this firm) to our Account No. 14-1140.

Respectfully submitted,

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